

Developing a Federated Data Model for Built Environment Digital Twins

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ABSTRACT

The Digital Twin (DT) concept is increasingly employed as a powerful tool to support data-driven decision making in management of the built environment. Various open Data Models (DM), addressing specific scale and domain applications, can be found in the literature. However, many DT implementations are based on organisation-specific information management processes and proprietary DM, which hinder interoperability. This paper aims to present the process and information management approaches adopted for developing a federated metamodel supporting DT applications. The Information Delivery Manual (IDM) technique, is applied adopting a cross-disciplinary and multi-scale methodology. The proposed framework is applied to the West Cambridge Campus Digital Twin research facility, identifying five main phases: Information Requirements (IR) definition, data schemes mapping, conceptual model definition, prototyping, testing and validation. An insight into IR definition, employing the Industry Foundation Classes (IFC) schema is presented. Although additional testing and case studies are required for validation, the proposed methods are currently used to explore and develop DT applications at the building and built environment levels.